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floated on the solution, and which appeared to differ from that obtained as first mentioned.

Dr. Hare made these observations, and those previously communicated respecting the hyponitrite of methyl, by the aid of a small quantity of pure pyroxylic spirit, supplied to him by his friend Dr. Ure, and regretted that both ill health and the exhaustion of his stock of spirit had prevented him from making further observations and experiments, tending to decide whether the ethers obtained, as he had described, were either or both hypochlorites, or whether mercury entered into the composition of the heavier ether. This there was some reason for believing; since, when boiled to dryness at a high temperature, a reddish residuum was apparent, which being redissolved, and a small strip of copper immersed in the resulting solution, a minute deposition, apparently metallic, was observable.

Dr. Dunglison drew the attention of the Society to the subject of a monument to Mr. Vaughan, on which resolutions had been passed on the occasion of Mr. Vaughan's death; whereupon, on motion of Dr. Chapman, a Committee was appointed to carry the resolutions into effect. Committee, Dr. Chapman, Dr. Dunglison and Mr. Kane.

Mr. Kane reminded the Society of its pledge to appropriate a certain sum of money for the Magnetic Observatory; whereupon, on motion of Dr. Chapman, it was resolved that the Committee, having charge of the subject, pay over the sum of one hundred and ninety dollars, now in their hands, for the use of the Magnetic Observatory.

Stated Meeting, April 15.

Present, thirty-seven members.

Mr. Du Ponceau, President, in the Chair.

A letter was read from the Corporation of the University of Cambridge, Mass., dated 11th April, 1842, acknowledging the receipt of Vol. VIII. Part 1, of the Society's Transactions.

A letter was also read from Isaac Elliott, Esq. addressed to Mr. Kane, enclosing an account against the Society for one hundred and forty-three dollars, for services rendered by him, and generously offering the amount thereof to the acceptance of the Society. Whereupon, on motion of Dr. Patterson, the donation was accepted, and it was resolved unanimously, that the thanks of the Society be returned to Mr. Elliott for the same.

The following donations were announced:—

FOR THE LIBRARY.

The American Journal of the Medical Sciences. Edited by Isaac Hays, M.D. New Series. No. 6. 8vo. Philadelphia, April, 1842.—*From the Editor.*

Whirlwind Storms; with a Reply to the Objections and Strictures of Dr. Hare. By W. C. Redfield. 8vo.—*From the Author.*

A New Key to the Exact Sciences. By F. Tillett. 8vo. 1824.—*From Professor Silliman.*

Catalogue of the Phenogamous Plants and Trees, growing, without Cultivation, within five miles of Yale College. 8vo. 1831.—*From the same.*

The Condition of the New Haven Burying Ground. 8vo. New Haven, 1839.—*From the same.*

An Essay on Matter. 8vo. Philadelphia, 1784.—*From the same.*

Twenty-Six Letters respecting the Revolution of America. Written in Holland in the year 1780. By John Adams. 12mo. New York, 1789.—*From the same.*

Sixth Geological Report to the General Assembly of Tennessee. Made October, 1841. By Gerard Troost, M.D. 8vo. Nashville, 1841.—*From the Author.*

Flora Batava, ou Figures et Descriptions de Plantes Belgiques. Par J. Kops et F. A. W. Miquel. Parts 123 & 124. 4to. Amsterdam, 1841.—*From his Majesty, the King of the Netherlands.*

Public Documents. No. 174. Second Session, Twenty-seventh Congress.—*From the Hon. G. W. Toland.*

On Regimen and Longevity. By John Bell, M.D. 8vo. Philadelphia, 1842.—*From the Author.*

Mr. G. W. Smith presented some Daguerreotype portraits, made by Mr. Cornelius by an improved process, an important part of which was the greater polish given to the plate, and the absence of cross lines.

Prof. A. D. Bache described the mode in which the self-registering rain gauge, by Osler, employed at the Magnetic Observatory at the Girard College, was adapted to registering the fall of snow.

He stated that in this climate, during winters of ordinary severity, if a record of the fall of snow were not kept on the same plan with that of the quantity of rain, a very considerable hiatus would be caused in a year's observations. In Osler's self-registering rain gauge, the water is conducted by a pipe from the funnel of the gauge to the reservoir in which it is weighed. To adapt this apparatus to register the rate of fall of snow, it is only necessary to keep the temperature of the funnel and connecting tube a little above that of the freezing point of water.

Prof. Bache further stated, that an arrangement for this purpose had been made under his direction, by Mr. S. W. Hall, Assistant at the Magnetic Observatory, which had proved completely successful. The funnel of the gauge was surrounded by a metallic casing, connected by a pipe, covered with a bad conductor of heat, to a small boiler, placed upon the stove which warmed the Observatory. The boiler being once supplied with water, the steam rising from it kept the funnel moderately warm; and being entirely condensed in the pipe and casing, the water returned to the boiler. If no leak occurred in the apparatus, no additional supply of water was necessary.

Mr. Walker communicated to the Society the principal points of Mr. Simeon Borden's Reply to the Criticism of Mr. F. R. Hassler, on the Massachusetts Survey, as reported upon in the Proceedings of the Society, Vol. II. No. 18, p. 59.

The criticisms of Mr. Hassler are alluded to in the Proceedings, No. 19, page 98, and may be briefly stated as follows:—

1. The phrase Chronometric Survey is inapplicable.
2. The Massachusetts Survey should have been stated to be begun in 1824 instead of 1831.
3. The Survey is incomplete till the soundings have been taken.
4. A sextant of 4 inches radius is unfit for use in a trigonometric survey.
5. The phrase *vertical triangles*, in No. 18, p. 60, at bottom, is improper.
6. Mr. Hassler objects to the mode of deducing the value of a degree of the meridian from differences of latitude, obtained by the use of a 4 inch sextant, in the table, page 61.
7. The rejection of the four results, stated on page 62, is considered by Mr. Hassler as discreditable to the work, being what is called "*cooking*."

8. Mr. Hassler is at a loss for the meaning of the words " arithmetical progression," in p. 62.
9. The method of obtaining the value of a degree, perpendicular to the meridian, by the convergency of the meridians, is objected to as being above the compass of the instruments in use by Mr. Borden, and as being too general in its conclusions, from a survey on so small a scale.
10. " Chronometric determinations," p. 62, are insufficient for the purpose of ascertaining the value of a degree perpendicular to the meridian.
11. Mountain attraction is not observable by the instruments used by Mr. Borden.
12. Mr. Hassler prefers the adoption of Bessel's elements of the spheroid, deduced from a discussion of all the trigonometric surveys yet made, instead of those derived from a survey on so small a scale, even with the best instruments.
13. Mr. Borden's ellipticity, 1-345, is adduced as confirming the 12th objection.
14. The latitude of Boston State House, p. 64, is uncertain, as having no other basis than sextant observations.
15. Are the altitudes, p. 65, single altitudes or series?
16. Mr. H. objects to the comparison of the *single* results in the table of latitudes, p. 65, and recommends the reduction of Mr. Paine's observations, (if they are used at all,) according to their situation and proximity to two points, at the greatest interval apart, or two points, situated so near the extremes of the survey as to receive all the observations with the least possible reduction, so as to obtain the most plausible ultimate mean for comparison with the trigonometric operations.
17. Mr. H. thinks that the discrepancies in p. 66, are sufficient ground for rejecting " chronometric determinations," and considers their inadequacy as an established point in Geodesy.
18. The actual topography is imperfect, the Township Surveys never having been completed with sufficient minuteness. Mr. H. also objects to the use of the " camera lucida" for purposes of topography.
19. The expense of the Massachusetts Survey should not have been stated—not being a subject of scientific interest.

Mr. Walker stated, on behalf of the Committee whose report on Messrs. Borden and Paine's labours had been made the subject of criticism by the Superintendent of the Coast Survey, that, previous to the drawing up of the report, a comparison had been made of Borden's spheroidal elements with Bessel's values, contained in the 333d No. of Schumacher's Astronomische Nachrichten; and that the agreement had been considered sufficiently close, to sanction the publication of Mr. Borden's results in their original state, as affording an illustration of the degree of success and precision attainable in a survey on a small scale like that of Massachusetts,—with instruments of small compass—conducted with great economy and despatch,—and finally reduced by spheroidal elements *indigenous* to the survey.

Mr. W. was by no means the advocate of cheapening science, or of the use of inferior instruments in the public service, nor would he have advised the choice of such instruments as were used in determining the latitudes and azimuths in the Massachusetts Survey. He deemed it his duty, however, to say that the observers, Messrs. Borden and Paine, had made amends for the inferiority of their instruments by the application of extraordinary tact and skill, and had produced a survey adequate for all the purposes originally contemplated by the Legislature of Massachusetts. The discrepancies between the astronomical and topographical results in the tables referred to by Mr. Hassler, except for the stations of Pittsfield and Williamstown, are not much greater than those which the European surveys present. And the close agreement of the value of the degree perpendicular to the meridian, obtained by chronometric differences of longitude, with the most approved values of this element, shows that these instruments may be employed as an important auxiliary of a trigonometric survey. Indeed, from a comparison of the final results, for this small survey, (more extensive, however, than any other yet made, as far as regards the use of chronometers,) it must be manifest to any one that an extension of a similar comparison of chronometric and trigonometric results over the entire surface of the United States, besides furnishing all the requisites for topography, would form a valuable contribution to science, and perhaps go far to settle the question, how far the shape of the surface of this portion of the western continent conforms to the measures of the eastern. Mr. Borden had omitted no expedient for obviating the errors of the eccentricity of his repeating circle, and his complete success may be inferred from the fact that the sides of twenty miles length, derived from the original base by different series of triangles, conformed together within three feet on the average, and never differed more than five feet.

Mr. Walker stated that he differed in opinion from Mr. Hassler, in reference to the precision of the latitudes furnished from sextant observations by Mr. Paine. The 8½ inch sextant by Troughton was a choice instrument of its kind, and though absolute angles could not be measured by it without an error of perhaps 6″, yet, this error disappears, by observing, as in Mr. Paine's case, north and south stars of the same altitude on the same evening. There is not any necessary error outstanding, but that of the star catalogues. The others may vanish in the mean of a great number of observations. The same method was used with eastern and western altitudes for rating his chronometers; and being all executed by himself, there was no personal equation necessarily outstanding. It is to this compensation of small errors in the mean result that Messrs. Paine and Borden are indebted for the close agreement, (quite unexpected even by themselves,) of their spheroidal elements, derived from so small a survey, with the standard values of those elements derived from European triangulations. Mr. W. remarked that the publication of the statistics of the expense of the survey was useful to others, who contemplate similar undertakings, and had its example in the Transactions of other Academies.

Mr. W. then proceeded to notice Mr. Borden's answer to Mr. Hassler's objections to the Massachusetts Survey.

1. Any reader will understand the phrase "Chronometric Survey."
2. The Act of the Legislature ordering the Massachusetts Survey was passed in March, 1830.

3. The soundings are expected to be furnished by the Coast Survey.
4. The fine Troughton sextant used by Mr. Paine is 8½ inches in radius.
5. In computations relative to three-sided figures in the vertical, the phrase "*vertical triangles*" is not objectionable.
6. Will be answered in the sequel.
7. All the results are stated. Cooking, on the contrary, consists in suppressing unfavourable results, or altering the immediate data of instruments; not in rejecting results that differ too much from the mean.
8. Mr. B. refers to Mr. Hassler's Arithmetic, 8th edition, pages 127 and 128.
9. Mr. B. admits the difficulty of determining the value of a degree perpendicular to the meridian from the convergency of the meridians in low latitudes. He should not have adopted his result, had it differed much from that of the chronometers.
10. Mr. B. refers to the tables of comparison.
11. Mr. B. finds the average discrepancy between Mr. Paine's and the trigonometric results to be only about 0*s*.4 in time, omitting Pittsfield and Williamstown, where they amount respectively to 2*s*.0 and 1*s*.3, and too far exceed the mean to be ascribed to errors of observation. They are also in the right direction to indicate an attraction of the plumb line towards the stations, which are on the west side of a mountain, 2000 feet high, and 20 miles broad.

12 & 13. Mr. B. refers to the results derived from the use of Bessel's elements of the spheroid, which do not exhibit any important discrepancy. Mr. Borden's elements, derived from the Massachusetts Survey, correspond with Bessel's almost as closely as it is possible to compare two scales together.

14 & 15. Mr. Borden refers to Mr. Paine's Report, from which it appears that the numbers on p. 65 refer to single readings.

16. Mr. Borden prefers the method used by himself; inasmuch as his results are obtained from the elements of the survey alone, without any "a priori" supposition respecting the dimensions of the spheroid, which Mr. Hassler's method requires.
17. Mr. B. leaves the chronometric comparisons to speak for themselves.
18. Mr. Borden admits that many of the Township Surveys were imperfect. The "camera lucida" was not used by Mr. B. for topographical purposes—had never before heard the instrument mentioned in connexion with topography.
19. The statement of the cost of the Survey was furnished by Mr. Borden, in answer to the inquiries of the Committee, and is derived from the documents on file in the Department of State.

Mr. Borden, having thus noticed Mr. Hassler's objections, proceeds to remark, that it was to him a source of regret that better instruments had not at first been procured by the State,—that they would have been productive of greater economy, dispatch and confidence in the precision of the results. His aim, however, had been to attain the greatest possible precision which the instruments permitted, and he had submitted the results to the Society as nearly in their original form as was possible in a brief notice. He could not but hope that the work would soon be further tested by the extension and progress of the Coast Survey.

Comparison of Bessel's elements of the spheroid, from the mean of ten surveys hitherto executed (See Astr. Nachr. No. 333), with those derived by Mr. Borden from his triangulation, combined with Mr. Paine's differences of latitude and longitude.

ELEMENTS.	Values from Bessel's Elements.	Borden's Values from the Massachusetts Survey.	Discrepancy.
Equatorial radius in English feet,	20922811.640	20914728.000	
" " miles,	3962.653	3961.123	1.53
Semi-polar axis " feet,	20853232.370	20854128.000	
" " miles,	3949.476	3949.646	0.17
Degree of meridian for middle latitude, 42° 21′ 30″ in feet.	364393.550	364356.000	37.55
Degree perpendicular to meridian, do.	365723.230	365511.330	212.10
Degree of the parallel, do.	270249.750	270092.120	157.63
Latitude of southernmost point, Nantucket,	41° 16′ 57″.02	41° 16′ 56″.62	0″.40
Latitude of northernmost point, Newburyport,	42° 48′ 31″.98	42° 48′ 32″.15	0″.17

The comparison of Mr. Paine's differences of longitude by chronometers, with those of the triangulation, reduced respectively by Bessel's and Borden's elements of the spheroid, gives the following results for the several stations, referred to the Boston State House.

No.	Station.	Paine, West of Borden, in time.	Borden, West of Bessel, in time.
		s.	*s*
1	Boston,	0.00	0.00
2	Amherst,	+ 0.49	+ 0.20
3	Barnstable,	+ 0.15	— 0.11
4	Cambridge,	+ 0.62	+ 0.01
5	Dedham,	— 0.67	+ 0.02
6	Greenfield,	+ 0.31	+ 0.21
7	Gloucester,	+ 0.13	— 0.05
8	Holmes' Hole,	+ 0.01	— 0.06
9	Lowell,	— 0.32	+ 0.03
10	Monomoy,	+ 0.61	— 0.15
11	Nantucket,	— 0.11	— 0.13
12	New Bedford,	+ 0.33	— 0.02
13	Newburyport,	+ 0.39	— 0.03
14	Northampton,	+ 0.40	+ 0.22
15	Pittsfield,	+ 1.93	+ 0.31
16	Plymouth,	+ 0.56	— 0.06
17	Providence,	+ 0.91	+ 0.05
18	Salem,	+ 0.24	— 0.02
19	Sandwich,	+ 0.92	— 0.08
20	Springfield,	+ 0.15	+ 0.21
21	Taunton,	+ 0.63	+ 0.00
22	Truro,	+ 0.89	— 0.14
23	Williamstown,	+ 1.28	+ 0.30
24	Worcester,	+ 0.19	— 0.10
25	Squam,	— 0.29	— 0.05
26	Thatcher's Island,	— 0.27	— 0.07
27	Eastern Point,	+ 0.13	— 0.05
28	Baker's Island,	+ 0.57	— 0.04

In consequence of the remark of Mr. Hassler, that differences of longitude, obtained by the transportation of chronometers, do not possess the requisite precision for determining the elements for the reduction of the triangulation, and are consequently unfit for geodetic purposes, Mr. Borden was induced to compare the results derived from all the chronometric differences of longitudes, with Bessel's mean result from the ten trigonometric surveys hitherto executed. For this purpose, having ascertained that the convergency of the meridians derived from the Massachusetts survey was sufficiently precise, since a change of + 2.″78 would fit them to Bessel's elements, he proceeds, through the medium of this convergency, to compute the value of the degree perpendicular to the meridian for the latitude of the State House, Boston, 42° 21′ 30″, by means of Mr. Paine's longitudes of those of the principal stations (Nantucket excepted) which were obtained directly from the State House, omitting intermediate stations not directly compared with the State House, and using relative weights proportionate to the polar angle.

No.	Stations compared.	Degree perpendicular to meridian in feet.	Relative weight.	Product in feet.
		D	W	D × W
1	Boston and Northampton,	365119	1.00	365119
2	„ Springfield,	365356	0.97	354395
3	„ Greenfield,	365198	0.98	357894
4	„ Worcester,	365904	0.47	171976
5	„ Barnstable,	365804	0.48	175586
6	„ Gloucester,	365991	0.25	91498
7	„ Monomoy,	366382	0.68	249140
8	„ Plymouth,	367653	0.25	91913
9	„ Truro,	366897	0.64	234814
10	„ Nantucket,	365329	0.62	226504
		Aggregate,	6.34	2318839
		Paine's mean value,		365747
		Bessel's do.		365723
		Discrepancy in feet,		24

By comparing one of the stations, viz. Nantucket, with New Bedford, with which it was actually compared by Mr. Paine, the tenth result becomes 364690, with a weight 0.52. This substituted for No. 10 in the table, gives the mean result, 365701, which falls below that of Bessel as much, nearly, as the former exceeds it, and is preferred by Mr. Borden.

The conclusion from this examination is, that chronometric comparisons do afford the means of determining one of the elements of the reduction of a trigonometric survey, viz. the value of a degree perpendicular to the meridian, and that, too, with a degree of uniformity quite too great to be the result of a happy accident.

Dr. Patterson, from the Committees severally appointed to negotiate for the sale of the Society's Hall and for the purchase of the Museum property, and to take charge of the new building, &c. presented reports from each Committee, the consideration of which was postponed to a special meeting, to be held on the 29th of April next.

The following gentlemen were elected members of the Society:—

STEPHEN ENDLICHER, of Vienna.
D. HUMPHREYS STORER, M.D., of Boston.
SIMEON BORDEN, of Boston.

Special Meeting, April 29.

Present, forty-four members.

Dr. PATTERSON, Vice-President, in the Chair.

The reports, postponed for consideration at this meeting, were taken up, and referred to a special Committee, to report to the Society thereon, and on the whole subject to which they relate. Committee, Mr. G. M. Wharton, Mr. G. W. Smith, Mr. Breck, Mr. Williams, and Mr. Fisher.